LOW-FLOW FREQUENCY

The daily mean discharges in the AICW were determined by the BRANCH model simulation for the 1982-86 water years. This period of record is not long enough to produce a low-flow frequency curve for the AICW. Therefore, it was necessary to develop a relation between flows in the AICW and flows in the major tributary streams that have a longer period of record. A discharge relation as described by Riggs (1972) was used to extend the AICW flow record.

Running seven day average discharges for the 1982-85 water years at the gaging stations on the Waccamaw, Pee Dee, Little Pee Dee, and Lynches Rivers and the AICW (fig. 1) were used to develop the relation because of the large variability of simulated daily discharge in the AICW. The MOVE.1 regression method documented by Hirsch (1982) was used to establish a relation of the the log-transformed 7-day average discharges of the AICW to the log-transformed sum of the 7-day average discharges of the tributary streams, lagged by four days. The MOVE.1 regression method was used because it preserves variance better than the ordinary least squares method. The relation is shown in figure 10 and can be expressed by the equation:

$$Q_A = 0.121\ Q_T\ \ 0.944 \qquad (5)$$

where Q_A = AICW 7-day average discharge,

Q_T = sum of the 7-day average discharges of the tributary streams, lagged by four days.

The use of a 4-day lag between the discharge at the gaging stations on each of the four tributary streams and the discharge at the AICW provided the best fit for the relation. The standard deviation of the residuals of equation 5 is 33 percent. The correlation coefficient is 0.91, and the coefficient of determination is 0.83. Limits of the input data from which the equation was derived are 208 ft^3/s and 4,360 ft^3/s for AICW 7-day average discharges.

Equation 5 was verified by using it in computing 7-day average discharges for the 1986 water year and comparing the computed discharges to 7-day average discharges simulated by the BRANCH model (see figure 11). The standard deviation of the differences between discharges computed using the BRANCH model and equation 5 was within 27 percent of equation 5. A bias of 7 percent was significant at the 3 percent level of confidence, according to a T-test. However, this bias was not considered to be realistically significant because of the large standard deviation of the residuals of equation 5.

Equation 5 was used to calculate a longer period of record for use in the development of a 7-day average discharge low-flow frequency curve for the AICW. Seven-day running average discharges of the tributary streams were summed for each day of the concurrent 1954-86 climatic year period of record. The minimum 7-day summed tributary discharge was determined for